REMARKS

Claims 1-5 are presently pending in the application.

Claim 4 has been amended for clarity to more clearly recite that possible petroleum products which may be used as feed stocks are liquid fuels having boiling points within the boiling point ranges of the other listed petroleum products which may be used as feed stocks (about 30 to about 300°C). Support for this amendment may be found at least in paragraph [0055]. The alcohol feed stocks, previously recited in claim 4, are now recited in new claim 5. No new matter has been added by these amendments, and entry is respectfully requested.

The Examiner has formally rejected claim 4 under 35 U.S.C. § 112, second paragraph as being indefinite with regard to the phrase "boiling point within the range of those thereof." While not necessarily agreeing with the rejection, in view of the amendment to claim 4, reconsideration and withdrawal of the § 112 rejection are respectfully requested.

The Examiner has rejected claims 1-4 under 35 U.S.C. § 103(a) as being unpatentable over U.S. Patent Application Publication No. 2004/0014600 of Fukunaga ("Fukunaga '600"), U.S. Patent Application No. 2002/0150532 of Grieve et al. ("Grieve"), WO 99/64150 ("WO '150"), or U.S. Patent Application Publication No. 2002/0009408 of Wieland et al. ("Wieland") in view of U.S. Patent No. 5,268,346 of Ino et al. ("Ino"). Applicants respectfully traverse these rejections and the arguments in support thereof as follows, and respectfully request reconsideration and withdrawal of the rejections.

Rejection Under § 103(a) Based on Fukunaga '600 in view of Ino

Regarding claims 1-4, the Examiner argues that Fukunaga '600 discloses an autothermal process for producing a fuel gas in which the catalyst comprises a platinum group metal, such as ruthenium, on an alumina support. The catalyst may allegedly also contain cerium. The Examiner acknowledges that Fukunaga '600 does not specifically disclose that the support should contain 5 to 40% by mass of the cerium oxide and 60 to 95% by mass of the aluminum oxide. However, Ino allegedly discloses a catalyst for steam reforming of hydrocarbons

comprising a platinum group metal on a carrier which comprises 5 to 40 weight % ceria and 60 to 95 weight % alumina. Therefore, the Examiner concludes that it would have been obvious to employ the carrier of Ino for the catalyst in the process of Fukunaga '600, since it is suggested that the carrier may contain any suitable amounts of alumina and ceria, and since it is allegedly well known that the steam reforming reaction is one of the reactions that occurs during autothermal reforming. Applicants respectfully traverse this rejection as follows.

The Examiner notes that while Fukunaga '600 has an effective filing date of November 5, 2001, which is subsequent to the foreign priority date of the present application, no verified translation of the priority document has been filed. Accordingly, enclosed herewith is a verified translation of the priority document, JP 2001-141381, filed May 11, 2001. Since all of the claims are fully supported in the priority document, Applicants are entitled to the May 11, 2001 priority date, and Fukunaga does not qualify as prior art against the present application. Accordingly, reconsideration and withdrawal of the § 103(a) rejection based on Fukunaga '600 in view of Ino are respectfully requested.

Rejection Under § 103(a) Based on Grieve in view of Ino

Regarding claims 1-4, the Examiner argues that Grieve discloses an autothermal process for producing a fuel gas in which the catalyst comprises a platinum group metal, such as ruthenium, on an alumina support. The catalyst may allegedly also contain cerium. The Examiner acknowledges that Grieve does not specifically disclose that the support should contain 5 to 40% by mass of the cerium oxide and 60 to 95% by mass of the aluminum oxide. However, Ino allegedly discloses a catalyst for steam reforming of hydrocarbons comprising a platinum group metal on a carrier which comprises 5 to 40 weight % ceria and 60 to 95 weight % alumina. Therefore, the Examiner concludes that it would have been obvious to employ the carrier of Ino for the catalyst in the process of Grieve, since Grieve suggests that the carrier may contain any suitable amounts of alumina and ceria, and also allegedly suggests in claim 4 the equivalence between steam reforming and autothermal reforming. Applicants respectfully traverse this rejection as follows.

Initially, Applicants respectfully traverse the Examiner's interpretation of Grieve. The Examiner contends that in claim 4 Grieve suggests the equivalence between steam reforming and

autothermal reforming. However, claim 4 of Grieve simply recites possible oxidants, and is completely silent as to steam reforming or autothermal reforming. Applicants can find no suggestion in Grieve of the equivalence between autothermal reforming and steam reforming and in fact, these processes are not at all equivalent.

As described in the Background of the present application, autothermal reforming is a combination of an oxidation reaction and a steam reforming reaction. A catalyst for an autothermal reforming process controls the relative extent of the oxidation and steam reforming reactions, and a catalyst which is effective at steam reforming is not necessarily effective or suitable for autothermal reforming. Therefore, Applicants respectfully traverse the Examiner's contention that these types of reforming are equivalent and that it would have been obvious to use the steam reforming catalyst of Ino in the autothermal reforming process of Grieve. To the contrary, there would have been no motivation to combine Ino (directed to steam reforming) with Grieve (directed to autothermal reforming) and certainly no reasonable expectation of success in the proposed combination. It was only through experimentation that Applicants discovered that the use of the inventive catalyst containing ruthenium and a support having particular components in specific amounts is highly effective in autothermal reforming. The catalyst used in the method of the invention provides sufficient activity and working life and is able to suppress carbon from precipitating at a low steam/carbon ratio.

In order to demonstrate that a catalyst which is effective for steam reforming does not necessarily exhibit properties desirable for autothermal reforming, Applicants have performed additional comparative experiments which are described in the Declaration of Iwao Anzai Under 37 C.F.R. § 1.132 ("Anzai Declaration"), filed herewith. As explained in the Anzai Declaration, a catalyst which was effective for steam reforming exhibited lower conversion rate and produced larger amounts of carbon precipitation when used in autothermal reforming, even lower than catalysts used in the comparative examples in the application.

More specifically, comparative experiments were performed using catalysts I and J (described in the Comparative Examples of the present application) and newly prepared catalyst K. The chemical compositions of the three catalysts are summarized in Table 1 of the Anzai Declaration. Each of the three catalysts I-K was used in a steam reforming reaction and an

autothermal reaction, the results of which are provided in Tables 1 and 2 of the Anzai Declaration, respectively. It can be seen that catalyst K exhibited a very high conversion rate (100%) in the steam reforming reaction (Table 1). However, when used in the autothermal reaction, a significantly lower conversion rate was observed (71%), lower even than the rates of comparative catalysts I and J (Table 2). Furthermore, catalyst K produced a larger amount of carbon precipitation in the autothermal reaction than in the steam reforming reaction (4.8 % compared to 4%). Accordingly, despite the fact that catalyst K was effective at steam reforming and produced favorable properties, it was an inferior catalyst when utilized for autothermal reforming. It can be further seen that catalysts I and J exhibited significantly lower conversion rates in the autothermal reforming reactions (85% and 88% respectively) than in the steam reforming reactions (both 100%). These experiments thus demonstrate that there is no equivalence between steam and autothermal reforming, and that a catalyst which is good for steam reforming is not necessarily good for autothermal forming (and may even be counter indicated for such an application).

Accordingly, there would have been no motivation for one skilled in the art to utilize the steam reforming catalyst of Ino in the autothermal reforming process of Grieve, and no reasonable expectation of success in the proposed combination. Therefore, no *prima facie* case of obviousness has been established based on the proposed combination of Grieve and Ino, and reconsideration and withdrawal of the § 103(a) rejection are respectfully requested.

Rejection Under § 103(a) Based on Wieland in view of Ino

Regarding claims 1-4, the Examiner argues that Wieland discloses an autothermal process for producing a fuel gas in which the catalyst comprises a platinum group metal, such as ruthenium, on an alumina support. The catalyst may allegedly also contain cerium. The Examiner acknowledges that Wieland does not specifically disclose that the support should contain 5 to 40% by mass of the cerium oxide and 60 to 95% by mass of the aluminum oxide. However, Ino allegedly discloses a catalyst for steam reforming of hydrocarbons comprising a platinum group metal on a carrier which comprises 5 to 40 weight % ceria and 60 to 95 weight % alumina. Therefore, the Examiner concludes that it would have been obvious to employ the carrier of Ino for the catalyst in the process of Wieland, since Wieland allegedly suggests that the

carrier may contain any suitable amounts of alumina and ceria, and also suggests the equivalence between steam reforming and autothermal reforming. Applicants respectfully traverse this rejection as follows.

The filing date of Wieland, May 14, 2001, is subsequent to the May 11, 2001 priority date of the present application, the filing date of the JP 2001-141381 priority document. As previously explained, all of the pending claims are fully supported in the priority document, a verified translation of which is enclosed herewith. Accordingly, Wieland is not prior art against the present application and reconsideration and withdrawal of the § 103(a) rejection based on Wieland in view of Ino are respectfully requested.

Rejection Under § 103(a) Based on WO '150 in view of Ino

Regarding claims 1-4, the Examiner argues that WO '150 (using Fukunaga '828 as an English translation) discloses an autothermal process for producing a fuel gas in which the catalyst comprises a platinum group metal, such as ruthenium, on an alumina support. The catalyst may allegedly also contain cerium. The Examiner acknowledges that WO '150 does not specifically disclose that the support should contain 5 to 40% by mass of the cerium oxide and 60 to 95% by mass of the aluminum oxide. However, Ino allegedly discloses a catalyst for steam reforming of hydrocarbons comprising a platinum group metal on a carrier which comprises 5 to 40 weight % ceria and 60 to 95 weight % alumina. Therefore, the Examiner concludes that it would have been obvious to employ the carrier of Ino for the catalyst in the process of WO '150, since it is suggested that the carrier may contain any suitable amounts of alumina and ceria, and since it is allegedly well-known that the steam reforming reaction is one of the reactions that occurs during autothermal reforming. Applicants respectfully traverse this rejection as follows.

The Examiner contends that since steam reforming is one of the reactions that occurs during autothermal reforming, it would have been obvious to utilize the steam reforming catalyst of Ino in the autothermal reforming process of WO '150. Applicants respectfully traverse this conclusion, since, as previously explained and demonstrated in the Anzai Declaration, steam reforming and autothermal reforming processes are not equivalent. Further, the fact that steam reforming is a component of autothermal reforming does not mean that a catalyst which is effective in steam reforming will be effective at autothermal reforming, since the latter involves

an additional oxidation reaction. Accordingly, there would have been no motivation for one to utilize the steam reforming catalyst of Ino in the autothermal reforming reaction of WO '150, and no reasonable expectation of success in the proposed combination. Therefore, no *prima facie* case of obviousness has been established based on the proposed combination of WO '150 and Ino, and reconsideration and withdrawal of the § 103(a) rejection are respectfully requested.

In view of the preceding Amendments, Remarks, and § 132 Declaration, it is respectfully submitted that the pending claims are in compliance with § 112, patentably distinct from the prior art of record and in condition for allowance. A Notice of Allowance is respectfully requested.

Respectfully submitted,

IWAO ANZAI et al.

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(Date)

SANDRA M. KATZ
Registration No. 51,864
AKIN GUMP STRAUSS HAUER & FELD LLP
One Commerce Square
2005 Market Street, Suite 2200
Philadelphia, PA 19103-7013
Telephone: 215-965-1200
Direct Dial: 215-965-1344
Facsimile: 215-965-1210
E-Mail: skatz@akingump.com

WWS/SMK:rc
Enclosures: Petition for Extension of Time (three months); Verified Translation of JP 2001-141381; Declaration of Iwao Anzai Under 37 C.F.R. § 1.132